



**WANSEMI**  
万芯半导体

**WP1004S3**

# **Enhancement Mode N-Channel Power MOSFET**

**SOT23-3/NMOS/100V/±20V/1.5V/4A/84mΩ**

**Rev1.2**

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## 100V, 84mΩ, 4A, Single N-Channel

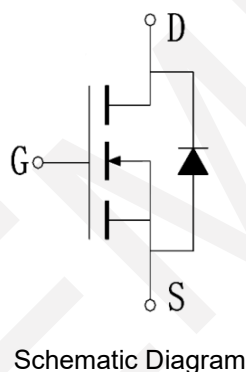
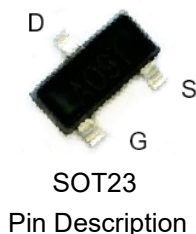
### 1.Features

- ◆ 100V MOSFET technology
- ◆ Low on-state resistance
- ◆ Fast switching
- ◆  $V_{GS} \pm 20V$

| $V_{DS}$ | $R_{DS(on)}$ Typ. | $I_D$ Max. |
|----------|-------------------|------------|
| 100V     | 84mΩ @ 10V        | 4A         |
|          | 90mΩ @4.5V        |            |

### 2.Applications

- ◆ Power Switching Application
- ◆ Load Switching



### 3.Package Marking and Ordering Information

| Part no. | Marking | Package | PCS/Reel | PCS/CTN. |
|----------|---------|---------|----------|----------|
| WP1004S3 | 1004    | SOT23-3 | 3,000    | 180,000  |

### 4.Absolute Max Ratings at $T_a=25^{\circ}C$ (Note1)

| Parameter                                 | Symbol    | Maximum     | Units       |
|-------------------------------------------|-----------|-------------|-------------|
| Drain to Source Voltage                   | $V_{DSS}$ | 100         | V           |
| Gate to Source Voltage                    | $V_{GSS}$ | $\pm 20$    | V           |
| Drain Current (DC)                        | $I_D$     | 4           | A           |
| Drain Current (Pulse), $PW \leq 300\mu s$ | $I_{DP}$  | 16          | A           |
| Total Dissipation                         | $P_D$     | 1.2         | W           |
| Junction Temperature                      | $T_j$     | 150         | $^{\circ}C$ |
| Storage Temperature                       | $T_{stg}$ | -55 to +150 | $^{\circ}C$ |

Note 1: Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### 5. Thermal Resistance Ratings (Note 2)

| Parameter                               | Symbol          | Value | Unit                 |
|-----------------------------------------|-----------------|-------|----------------------|
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 158   | $^{\circ}\text{C/W}$ |

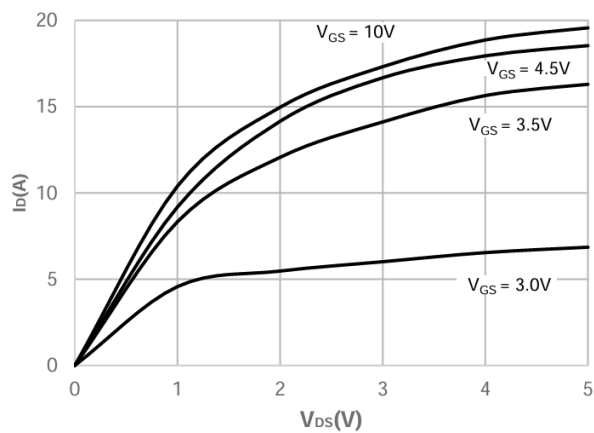
Note 2: When mounted on 1 inch square copper board  $t \leq 10\text{sec}$  The value in any given application depends on the user's specific board design.

### 6. Electrical Characteristics at $T_a=25^{\circ}\text{C}$ (Note 3)

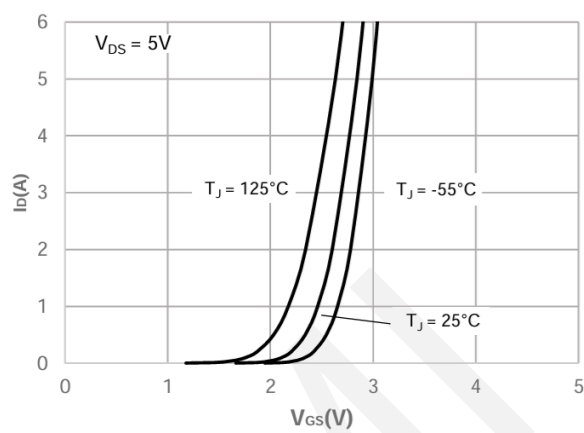
| Parameter                                  | Symbol        | Test Conditions                                                                        | Min. | Typ. | Max.      | Units            |
|--------------------------------------------|---------------|----------------------------------------------------------------------------------------|------|------|-----------|------------------|
| Drain to Source Breakdown Voltage          | $V_{(BR)DSS}$ | $I_D = 250\mu\text{A}$ , $V_{GS} = 0\text{V}$                                          | 100  | -    | -         | V                |
| Zero-Gate Voltage Drain Current            | $I_{DSS}$     | $V_{DS} = 100\text{V}$ , $V_{GS} = 0\text{V}$                                          | -    | -    | 1         | $\mu\text{A}$    |
| Gate to Source Leakage Current             | $I_{GSS}$     | $V_{GS} = \pm 20\text{V}$ , $V_{DS} = 0\text{V}$                                       | -    | -    | $\pm 100$ | nA               |
| Gate Threshold Voltage                     | $V_{GS(th)}$  | $V_{DS}=V_{GS}$ , $I_{DS}=250\mu\text{A}$                                              | 1.0  | 1.5  | 2.5       | V                |
| Static Drain to Source On-State Resistance | $R_{DS(on)}$  | $I_D = 4\text{A}$ , $V_{GS} = 10\text{V}$                                              | -    | 84   | 105       | $\text{m}\Omega$ |
|                                            |               | $I_D = 3\text{A}$ , $V_{GS} = 4.5\text{V}$                                             | -    | 90   | 125       | $\text{m}\Omega$ |
| Input Capacitance                          | $C_{iss}$     | $V_{GS}=0\text{V}$ ,<br>$V_{DS}=50\text{V}$ ,<br>Frequency=1.0MHz                      | -    | 818  | -         | pF               |
| Output Capacitance                         | $C_{oss}$     |                                                                                        | -    | 31   | -         | pF               |
| Reverse Transfer Capacitance               | $C_{rss}$     |                                                                                        | -    | 25   | -         | pF               |
| Turn-ON Delay Time                         | $t_{d(on)}$   | $V_{DD} = 50\text{V}$ , $I_D = 4\text{A}$<br>$V_{GS} = 10\text{V}$ , $R_G = 6.2\Omega$ | -    | 5.4  | -         | ns               |
| Rise Time                                  | $t_r$         |                                                                                        | -    | 3.9  | -         | ns               |
| Turn-OFF Delay Time                        | $t_{d(off)}$  |                                                                                        | -    | 23   | -         | ns               |
| Fall Time                                  | $t_f$         |                                                                                        | -    | 2.6  | -         | ns               |
| Total Gate Charge                          | $Q_g$         | $V_{DS} = 50\text{V}$ ,<br>$V_{GS} = 0$ to $10\text{V}$ ,<br>$I_D = 4\text{A}$         | -    | 20   | -         | nC               |
|                                            | $Q_{gs}$      |                                                                                        | -    | 2.9  | -         | nC               |
|                                            | $Q_{gd}$      |                                                                                        | -    | 4.4  | -         | nC               |
| Diode Forward Voltage                      | $V_{FSD}$     | $I_S = 4\text{A}$ , $V_{GS} = 0\text{V}$                                               | 0.5  | -    | 1.2       | V                |

Note 3: Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

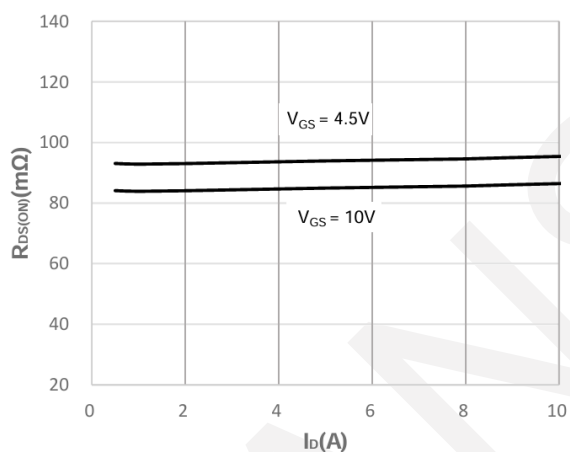
## 7. Typical Electrical and Thermal Characteristics



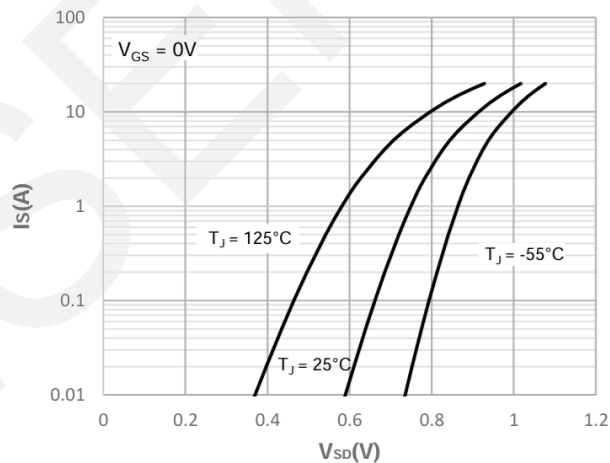
**Output Characteristics**



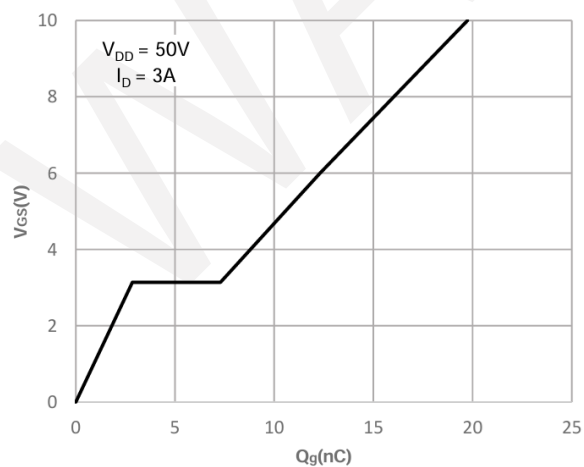
**Typical Transfer Characteristics**



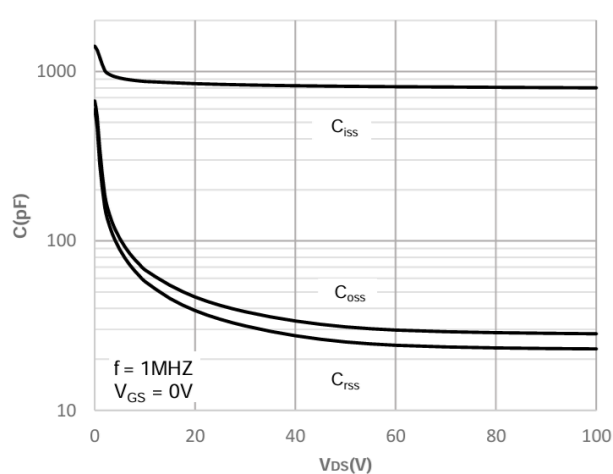
**On-resistance vs. Drain Current**



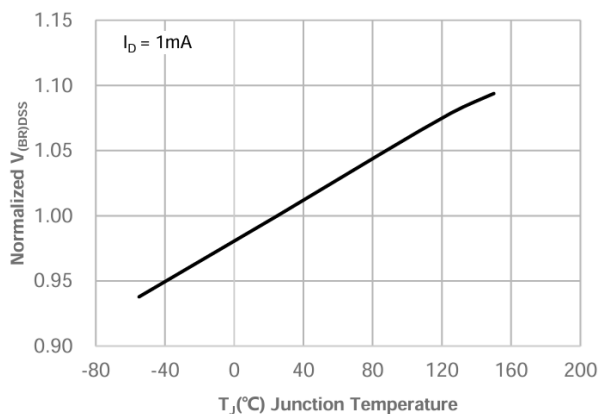
**Body Diode Characteristics**



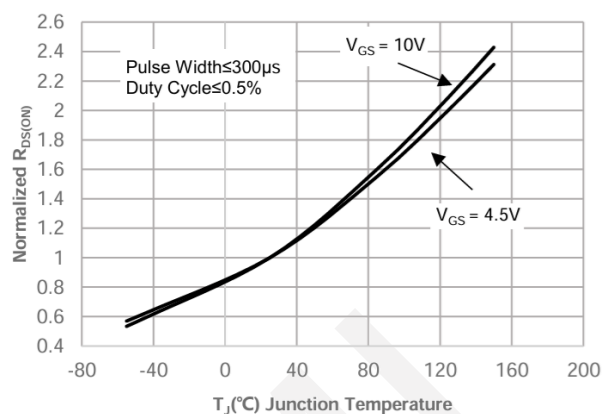
**Gate Charge Characteristics**



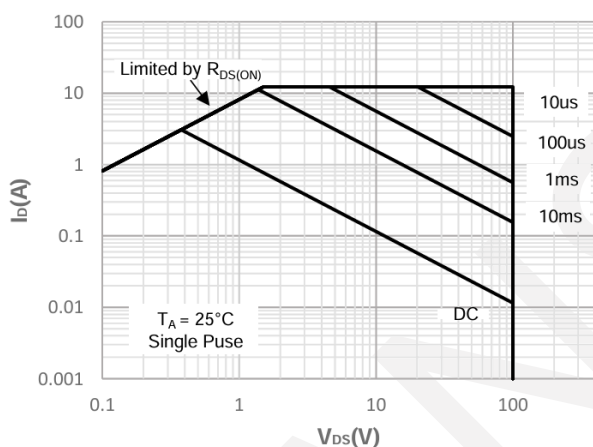
**Capacitance Characteristics**



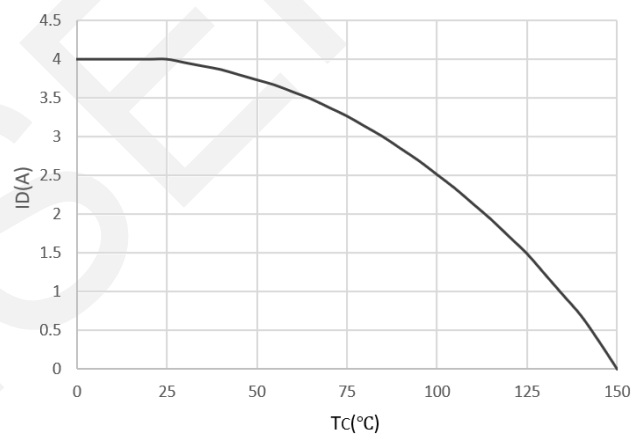
Normalized Breakdown Voltage vs.  
Junction Temperature



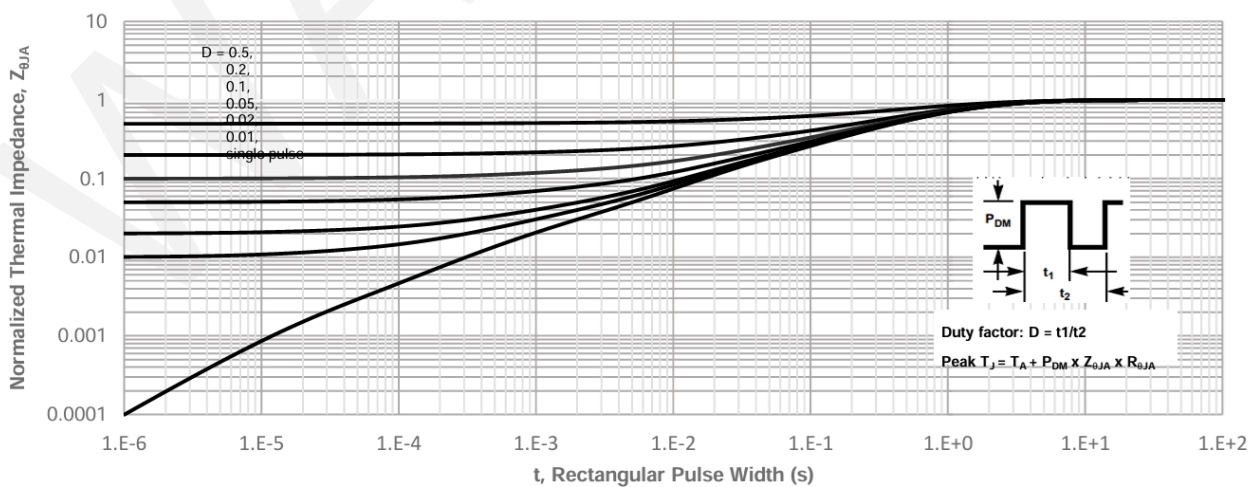
Normalized on Resistance vs.  
Junction Temperature



Maximum Safe Operating Area

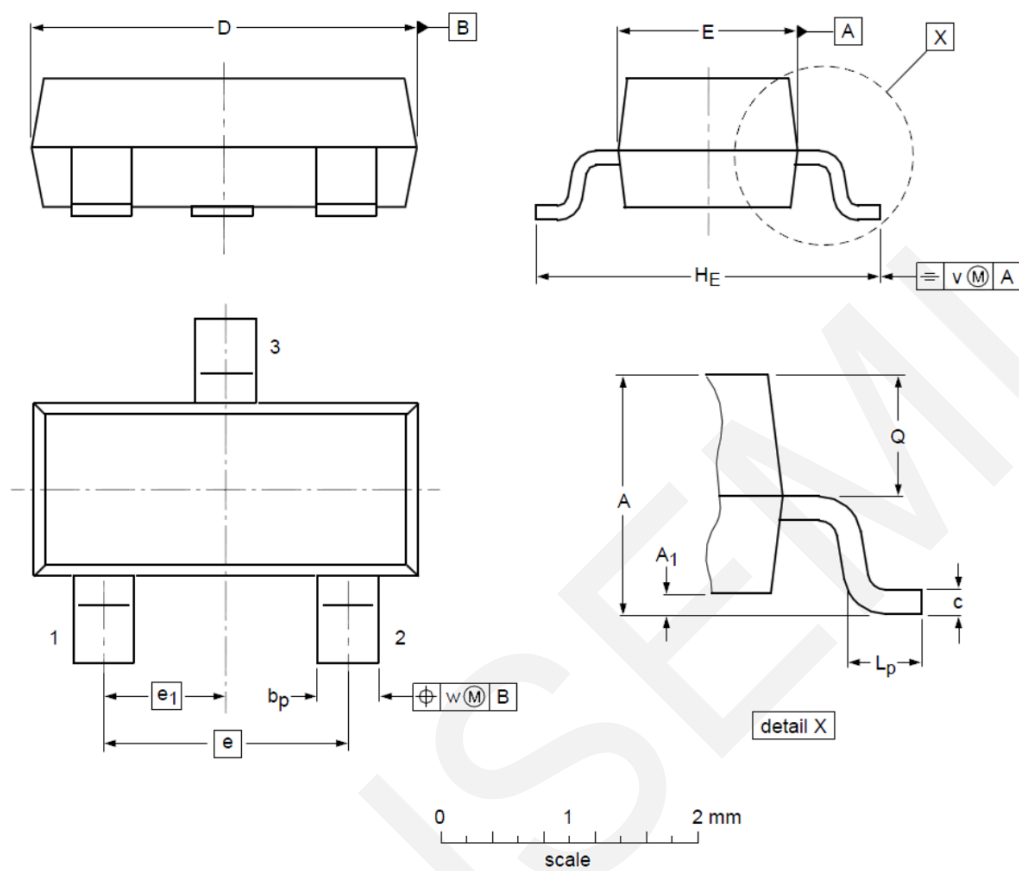


Maximum Continuous Drain Current vs.  
Case Temperature



Maximum Effective Transient  
Thermal Impedance, Junction-to-Case

## 8.Package Dimensions



**DIMENSIONS** ( unit : mm )

| Symbol               | Min  | Typ  | Max  | Symbol               | Min  | Typ  | Max  |
|----------------------|------|------|------|----------------------|------|------|------|
| <b>A</b>             | 1.00 | 1.17 | 1.30 | <b>A<sub>1</sub></b> | 0.01 | 0.05 | 0.10 |
| <b>b<sub>p</sub></b> | 0.35 | 0.39 | 0.50 | <b>c</b>             | 0.10 | 0.20 | 0.26 |
| <b>D</b>             | 2.70 | 2.90 | 3.10 | <b>E</b>             | 1.30 | 1.58 | 1.70 |
| <b>e</b>             | --   | 1.90 | --   | <b>e<sub>1</sub></b> | --   | 0.95 | --   |
| <b>H<sub>E</sub></b> | 2.50 | 2.78 | 3.00 | <b>L<sub>p</sub></b> | 0.20 | 0.32 | 0.60 |
| <b>Q</b>             | 0.23 | 0.27 | 0.33 | <b>v</b>             | --   | 0.20 | --   |
| <b>w</b>             | --   | 0.20 | --   |                      |      |      |      |

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